WHAT IS CLAIMED IS:

1. An electron beam irradiation apparatus for irradiating an electron beam to an object, comprising:

an electron beam generating section for generating an electron beam;

a plurality of backscattered electron detectors for detecting backscattered electrons generated when the electron beam is irradiated on a mark;

a plurality of attenuation sections for attenuating signal values indicating quantity of backscattered electrons detected by said plurality of backscattered electron detectors; and

a defect detecting section for detecting a defect of said plurality of backscattered electron detectors based on the signal values attenuated by said plurality of attenuation sections, with attenuation factors for said plurality of attenuation sections being varied.

2. The electron beam irradiation apparatus as claimed in claim 1, further comprising:

a plurality of IV converters for converting the quantity of electrons detected by said plurality of backscattered electron detectors in to voltages, and for generating signal values indicating the quantity of the backscattered electrons; and

a plurality of amplifiers for amplifying the signal values generated by said plurality of IV converters, wherein

said defect detecting section detects a defect of said plurality of backscattered electron detectors, said plurality of IV converters, and said plurality of amplifiers.

3. The electron beam irradiation apparatus as claimed in claim 1, further comprising an ideal value storage section storing thereon an ideal value, which is a signal value indicating the quantity of the backscattered electrons detected by said plurality of backscattered electron detectors when said plurality of backscattered electron detectors are normal, wherein

said defect detecting section detects the defect of said plurality of backscattered electron detectors by comparing the signal values attenuated by said plurality of said attenuation sections with the ideal value stored on said ideal value storage section.

4. The electron beam irradiation apparatus as claimed in claim 3, further comprising an attenuated signal adder for adding a signal value attenuated by a first attenuation section of said plurality of attenuation sections, and a signal value attenuated by a second attenuation section of said plurality of attenuation sections, wherein

said first attenuation section attenuates the signal value indicating the quantity of the backscattered electrons detected by a first backscattered electron detector of said plurality of backscattered electron detectors by a first attenuation factor based on control of said defect detecting section,

said second attenuation section attenuates the signal value indicating the quantity of the backscattered electrons detected by a second backscattered electron detector of said plurality of backscattered electron detectors by a second attenuation factor based on control of said defect detecting section,

said attenuated signal adder adds the signal value attenuated by said first attenuation section by the first attenuation factor, and the signal value attenuated by said second attenuation section

by the second attenuation factor, and supplies the added signal to said defect detecting section, and

said defect detecting section detects the defect of at least one of said first backscattered electron detector and said second backscattered electron detector by varying the first attenuation factor and the second attenuation factor.

5. The electron beam irradiation apparatus as claimed in claim 1, further comprising:

a plurality of detected signal adders for adding signal values indicating the quantity of the backscattered electrons detected by said plurality of backscattered electron detectors; and

an attenuated signal adder for adding a signal value attenuated by a first attenuation section of said plurality of attenuation sections, and a signal value attenuated by a second attenuation section of said plurality of attenuation sections, wherein

said plurality of backscattered electron detectors comprise:

a first backscattered electron detector and a second backscattered electron detector disposed across an optical axis of the electron beam; and

a third backscattered electron detector and a fourth backscattered electron detector disposed across the optical axis of the electron beam,

said plurality of detected signal adders comprise:

a first detected signal adder for adding a signal value indicating the quantity of the backscattered electrons detected by said first backscattered electron detector, and a signal value

indicating the quantity of the backscattered electrons detected by said second backscattered electron detector; and

a second detected signal adder for adding a signal value indicating the quantity of the backscattered electrons detected by said third backscattered electron detector, and a signal value indicating the quantity of the backscattered electrons detected by said fourth backscattered electron detector,

said plurality of attenuation sections comprise:

a first attenuation section for attenuating a signal value added by said first detected signal adder by a first attenuation factor; and

a second attenuation section for attenuating a signal value added by said second detected signal adder by a second attenuation factor,

said attenuated signal adder adds the signal value attenuated by said first attenuation section by the first attenuation factor, and the signal value attenuated by said second attenuation section by the second attenuation factor, and supplies the added signal to said defect detecting section, and

said defect detecting section detects defect of at least one of said first backscattered electron detector, said second backscattered electron detector, said third backscattered electron detector, and said fourth backscattered electron detector by varying the first attenuation factor and the second attenuation factor.

6. The electron beam irradiation apparatus as claimed in claim 5, further comprising:

an ideal value storage section storing thereon an ideal value which is a signal value to be supplied from said attenuated signal adder to said defect detecting section when said first

backscattered electron detector, said second backscattered electron detector, said third backscattered electron detector, and said fourth backscattered electron detector are normal and when each of the first attenuation factor and the second attenuation factor is set to a predetermined attenuation factor; and

a permissible value storage section storing thereon a predetermined permissible value used as a judgment criterion of defect detection, wherein

said defect detecting section judges whether a difference between a first detected signal value, which is a signal value supplied from said attenuated signal adder when each of the first attenuation factor and the second attenuation factor is set to the predetermined attenuation factor, and the ideal value stored on said ideal value storage section is within the predetermined permissible value, and said defect detecting section detects that at least two of said first backscattered electron detector, said second backscattered electron detector, said third backscattered electron detector, and said fourth backscattered electron detector are defective when it is measured that the difference between the first detected signal value and the ideal value is not within the predetermined permissible value.

7. The electron beam irradiation apparatus as claimed in claim 6, wherein

said permissible value storage section further stores another permissible value, which is smaller than the predetermined permissible value,

said defect detecting section judges whether each of a difference between the second detected signal value and the half of the first detected signal value, and a difference between the third detected signal value and the half of the first detected

signal value, is within the other permissible value when it is measured that the difference between the first detected signal value and the ideal value is within the predetermined permissible value, and said defect detecting section detects that said first backscattered electron detector, said second backscattered electron detector, said third backscattered electron detector, and said fourth backscattered electron detector are normal when it is judged that each of the difference between the second detected signal value and the half of the first detected signal value, and the difference between the third detected signal value and the half of the first detected signal value, is within the other permissible value, where

the second detected signal value is a signal value supplied from said attenuated signal adder when the first attenuation factor is set to the predetermined attenuation factor and the second attenuation factor is set to another attenuation factor, which is greater than the predetermined attenuation factor, and

the third detected signal value is a signal value supplied from said attenuated signal adder when the first attenuation factor is set to the other attenuation factor and the second attenuation factor is set to the predetermined attenuation factor.

8. The electron beam irradiation apparatus as claimed in claim 7, wherein said defect detecting section compares the second detected signal value with the third detected signal value when it is measured that either the difference between the second detected signal value and the half of the first detected signal value, or the difference between the third detected signal value and the half of the first detected signal value, is not within the other permissible value, and said defect detecting section detects that at least one of the first backscattered electron

detector and the second backscattered electron detectors is defective when the second detected signal value is less than the third detected signal value, and said defect detecting section detects that at least one of the third backscattered electron detector or the fourth backscattered electron detectors is defective when the third detected signal value is less than the second detected signal value.

9. A defect detection method of detecting a defect of a backscattered electron detector, comprising steps of:

detecting backscattered electrons by a plurality of backscattered electron detectors, the backscattered electrons being generated when an electron beam is irradiated on the mark;

attenuating signal values indicating quantity of backscattered electrons detected by the plurality of backscattered electron detectors; and

detecting a defect of the plurality of backscattered electron detectors based on attenuated signal values, with attenuation factors in said attenuation step being varied.

10. The defect detection method as claimed in claim 9, wherein said defect detection step comprises a step of detecting defect of the plurality of backscattered electron detectors by comparing the ideal value, which is a signal value indicating the quantity of the backscattered electrons detected by the plurality of backscattered electron detectors when the plurality of backscattered electron detectors are normal, with the signal value attenuated in said attenuation step.

11. The defect detection method as claimed in claim 9, wherein said attenuation step comprises steps of:

attenuating a signal value indicating the quantity of the backscattered electrons detected by a first backscattered electron detector of the plurality of backscattered electron detectors by a first attenuation factor; and

attenuating a signal value indicating the quantity of the backscattered electrons detected by a second backscattered electron detector of the plurality of backscattered electron detectors by a second attenuation factor, wherein

a defect of at least one of the first backscattered electron detector and the second backscattered electron detector is detected in said defect detection step based on a signal value, which is a summation of the signal value attenuated by the first attenuation factor and the signal value attenuated by the second attenuation factor in said attenuation steps by varying the first attenuation factor and the second attenuation factor.

12. The defect detection method as claimed in claim 9, wherein said backscattered electron detection step comprises a step of detecting the backscattered electrons by a first backscattered electron detector and a second backscattered electron detector disposed across an optical axis of the electron beam, and by a third backscattered electron detector and a fourth backscattered electron detector disposed across an optical axis of the electron beam,

said attenuation step comprises steps of:

generating a first attenuation signal value by attenuating the signal value, which is a summation of the signal value indicating the quantity of backscattered electrons detected by the first backscattered electron detector and the signal value indicating the quantity of backscattered electrons detected by the second

backscattered electron detector, by a first attenuation factor; and

generating a second attenuation signal value by attenuating the signal value, which is a summation of the signal value indicating the quantity of backscattered electrons detected by the third backscattered electron detector and the signal value indicating the quantity of backscattered electrons detected by the fourth backscattered electron detector, by a second attenuation factor, and

a defect of at least one of the first backscattered electron detector, the second backscattered electron detector, the third backscattered electron detector, and the fourth backscattered electron detector is detected in said defect detection step based on the signal value, which is a summation of the first attenuation signal value and the second attenuation signal value generated in said attenuation step, by varying the first attenuation factor and the second attenuation factor.

13. The defect detection method as claimed in claim 12, wherein said defect detection step comprises steps of:

judging whether difference between a first detected signal value and an ideal value is within a predetermined permissible value; and

detecting that at least two of the first backscattered electron detector, the second backscattered electron detector, the third backscattered electron detector, and the fourth backscattered electron detectors are defective when it is measured that the difference between the first detected signal value and the ideal value is not within the predetermined permissible value, where

the first detected signal value is a summation of the first attenuation signal value and the second attenuation signal value where each of the first attenuation factor and the second attenuation factor is set to a predetermined attenuation factor, and

the ideal value is a summation of the first attenuation signal value and the second attenuation signal value when the first backscattered electron detector, the second backscattered electron detector, the third backscattered electron detector, and the fourth backscattered electron detector are normal and each of the first attenuation factor and the second attenuation factor is set to the predetermined attenuation factor.

14. The defect detection method as claimed in claim 13, wherein said defect detection step comprises steps of:

judging whether each of a difference between a second detected signal value and the half of the first detected signal value, and a difference between a third detected signal value and the half of the first detected signal value, is within another permissible value, which is smaller than the predetermined permissible value, when it is measured that the difference between the first detected signal value and the ideal value is within the predetermined permissible value; and

detecting that the first backscattered electron detector, the second backscattered electron detector, the third backscattered electron detector, and the fourth backscattered electron detector are normal when it is judged that each of the difference between the second detected signal value and the half of the first detected signal value, and the difference between the third detected signal value and the half of the first detected signal value, is within the other permissible value, where

the second detected signal value is a summation of the first attenuation signal value and the second attenuation signal value when the first attenuation factor is set to the predetermined attenuation factor and the second attenuation factor is set to another attenuation factor, which is greater than the predetermined attenuation factor, and

the third detected signal is a summation of the first attenuation signal value and the second attenuation signal value when the first attenuation factor is set to the other attenuation factor and the second attenuation factor is set to the predetermined attenuation factor.

15. The defect detection method as claimed in claim 14, further comprising a step of storing the first detected signal value as the ideal value when it is detected in said defect detection step that the first backscattered electron detector, the second backscattered electron detector, the third backscattered electron detector, and the fourth backscattered electron detector are normal.

16. The defect detection method as claimed in claim 14, wherein said defect detection step comprises steps of:

comparing the second detected signal value with the third detected signal value when at least either the difference between the second detected signal value and the half of the first detected signal value, or the difference between the third detected signal value and the half of the first detected signal value, is not within the other permissible value; and

detecting that at least one of the first backscattered electron detector and the second backscattered electron detector is defective when the second detected signal value is less than

the third detected signal value, and detecting that at least one of the third backscattered electron detector and the fourth backscattered electron detector is defective when the third detected signal value is less than the second detected signal value.

17. An electron beam exposure apparatus for exposing a pattern on a wafer by an electron beam, comprising:

an electron beam generating section for generating an electron beam;

a plurality of backscattered electron detectors for detecting backscattered electrons generated when the electron beam is irradiated on a mark;

a plurality of attenuation sections for attenuating signal values indicating quantity of backscattered electrons detected by said plurality of backscattered electron detectors; and

a defect detecting section for detecting a defect of said plurality of backscattered electron detectors by varying attenuation factors for said plurality of attenuation sections.